ROOT-KNOT OR EELWORM ATTACKS NEW HOSTS*

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In addition to the hosts known to be attacked by **Heterodera radicicola,** peculiar circumstances recently made it possible for the writer to note and observe its occurrence on seven new and unreported hosts.

Fig. 1. Root-knot of parsley.
Two-thirds natural size.
Photo by L. E. Melchers.

During December, 1913, the writer noticed the first indications of the root-knot on the tomato crop which was being grown in one of the greenhouses belonging to the Department of Horticulture of the Kansas State Agricultural College. By the end of April the tomato plants were removed on account of their unproductiveness, due to the eelworm infestation. The roots of these plants

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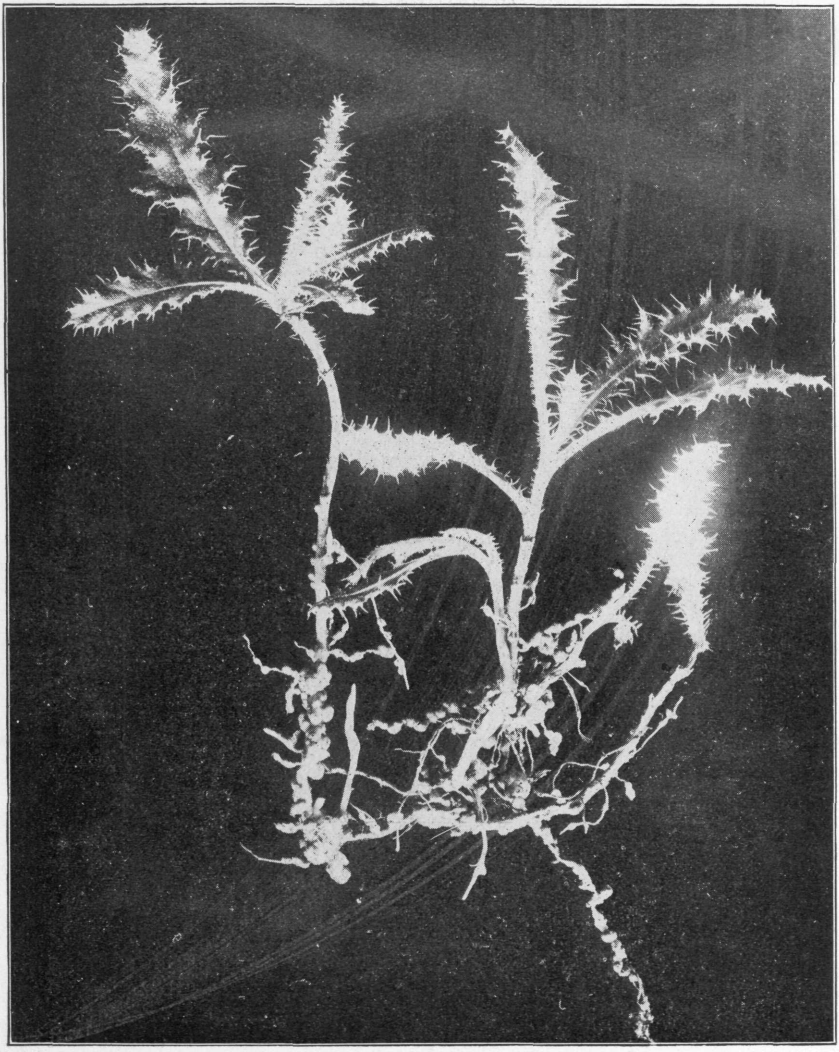

Fig. 2. Root-knot of Canada thistle.
Two-thirds natural size.
Photo by L. E. Melchers.

for the most part had decayed, liberating the eggs and egg-filled bodies of the female nematodes into the soil. The tops of the tomato plants and as many of the remaining roots as could be found, were removed from the bench. The soil itself, however, was not given a soil treatment, but was allowed to remain in an infested state.

The foreman in charge of the greenhouses gave directions to place various potted bedding plants on top of this bench, allowing the pots to come in direct contact with the soil which had previously grown the infested tomato crop. The experiment proved an interesting one, for among the potted plants there were a number which became infested, while, on the other hand, a few kinds which were under the same environmental conditions proved non-susceptible to an attack.

After having stood on top of this bench for more than a month, the following plants showed the development of nodules upon their roots, and upon a microscopic examination revealed the egg-filled nematodes of **Heterodera radicicola: Vinca rosea Linn.** (Madagascar Periwinkle), **Chrysanthemum frutescens Linn.** (Marguerite), **Celosia empress** (Cockscomb), **Matthiola incana Var. annua Voss.** (Ten-weeks or Intermediate stocks), **Zeæ mayz** (Burbank's Rainbow Corn), and **Phlox** (Phlox annual). The writer also reported **Cirsium arvense** (Canada thistle), a susceptible host (Science, 40::241, 1914). There were also a large number of other plants whuch were attacked, but only those which proved to be new hosts have been listed here.

The eelworm has been previously reported as attacking **Zeæ mayz** by Neal, B. P. I. (1889), Burbank's Rainbow corn being a horticultural variety of **Zeæ mayz.**

The following is a list of potted plants which remained apparently unaffected, although they were growing among the infested potted plants: **Centaurea imperialis** (Royal Sweet Sultan), **Calundula** (Pot marigold, Vaughan's Mammoth Mixture and Eldorado), **Salvia zurich** (Dwarf Sage), and **Canna** varieties.

The soil which was used in the bench was originally obtained from a nearby orchard, and was probably infested with **Heterodera radicicola** at the time that it was placed in the greenhouse bench, although it is possible, but not probable, that the organisms gained entrance through the application of infested manure; knowing the source of the fertilizer used, this did not appear to be the case. The soils in many sections of Kansas are badly infested with the eelworm, and the problem of economically combating this pest is becoming a serious problem, especially in the truck-growing regions where entire crops become affected.

Besides the above hosts, the writer obtained specimens of **Carum petroselinum** (parsley) from Hutchinson, Kansas, which

were badly affected with the nematode; this is likewise an unreported host. The plants were growing out in the open field at the time the injury was observed. It is not definitely known whether these plants became infected from nematodes which remained alive in the field over winter, or whether contamination resulted otherwise.

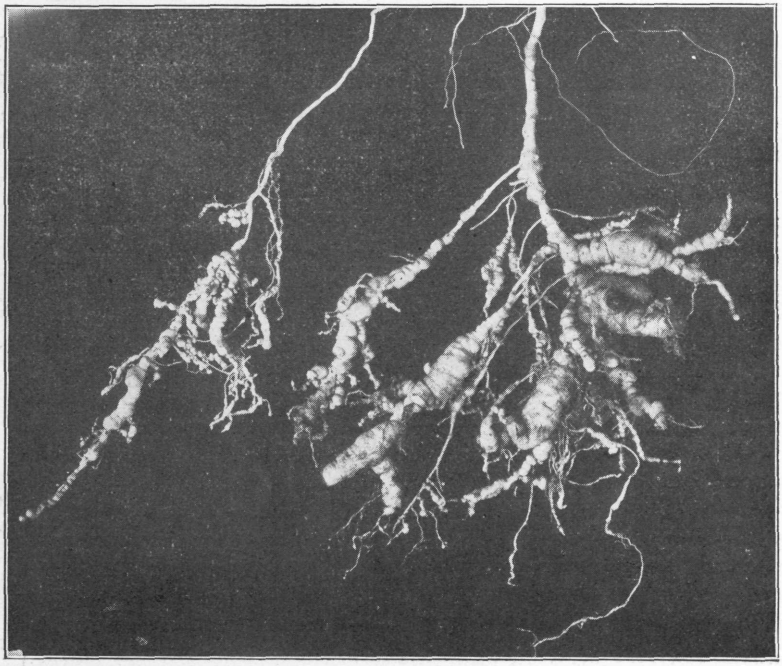

Fig. 3. Root-knot as it occurs on tomato.
Two-thirds natural size.
Photo by L. E. Melchers.

Apparently climatic conditions in this region cannot be too stringently depended upon as a means of control in holding the eelworm in check in the open fields. The winters vary in severity, and are not always severe enough to eradicate the pest in badly infested soils.

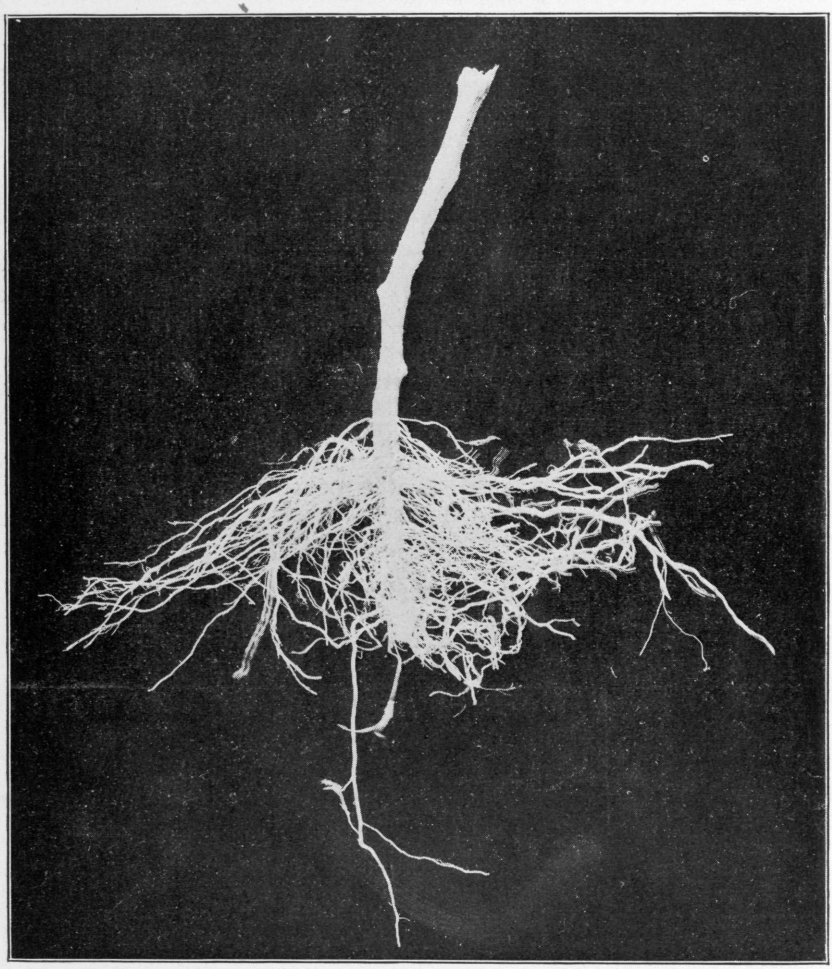

Fig. 4. Normal tomato root for comparison.
Two-thirds natural size.
Photo by L. E. Melchers.